

Karsten Pruess

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Education

Dr. phil. nat., 1972, University of Frankfurt, Germany; Major field: Theoretical Physics,
Minor fields: General Physics, Mathematics, Chemistry.

Dipl. Phys., 1969, University of Frankfurt, Germany (Physics)

Experience

Senior Scientist, Earth Sciences Division, Lawrence Berkeley National Laboratory (LBNL),
1987 - present

Principal Investigator, mathematical modeling of flow and transport processes in geologic
media, geologic storage of greenhouse gases, geothermal and hydrocarbon reservoir
engineering, fundamental studies of multiphase flows in porous and fractured media,
nuclear waste isolation, remediation and containment of subsurface contaminants, 1979 -
present

Faculty Associate, Earth Resources Center, University of California at Berkeley, 1996 -
present

Group Leader, Reservoir Engineering and Hydrogeology Group, 1987 - 91

Lecturer, Department of Materials Science and Mineral Engineering, University of California
at Berkeley, 1985 - present

Staff Scientist, Earth Sciences Division, LBNL, 1977 - 87

Visiting Professor, International Institute for Geothermal Research, Pisa, Italy, 1984, 1986

Research Fellow, Nuclear Theory Group, LBNL, 1975 - 77

Instructor, Department of Physics and Electrical Engineering, University of Bremen,
Germany, 1974 - 75

Research Associate, University of Frankfurt, Germany, 1972 - 74

Research and Teaching Assistant, Institute for Theoretical Physics, University of Frankfurt,
Germany, 1969 - 72

Professional Memberships

Society of Petroleum Engineers

American Geophysical Union

Geothermal Resources Council

Geological Society of America
Union of Concerned Scientists

Professional Activities

- Associate Editor, *Geothermics*, 2006 - present
- PhD Committee for Anozie Ebigbo, External Member, University of Stuttgart, Germany, 2007
- PhD Committee for W. M. Kissling, External Member, The University of Auckland, Auckland, New Zealand, 2004
- Associate Editor, *Vadose Zone Journal*, 2001 - 2004
- Associate Editor, *Transport in Porous Media*, 2000 - 2005
- Associate Editor, *Journal of Contaminant Hydrology*, 1998 - 2006
- PhD Committee for C.C. Palliser, External Member, Massey University, Palmerston North, New Zealand, 1998
- Member, SITE-Committee “Seeing into the Earth,” National Research Council, National Academy of Sciences, 1995 - 98
- Convenor, TOUGH Workshop, Berkeley, CA, May 1998, March 1995, September 1990
- Habilitation Committee, R. Helmig, External Member, University of Stuttgart, Stuttgart, Germany, 1996 - 97
- Member, U.S. DOE Unsaturated Zone Flow Model Expert Elicitation Panel, 1996 - 97
- PhD Committee for M.M. Fourar, External Examinator, Institut National Polytechnique de Toulouse, Toulouse, France, 1991 - 92
- Associate Editor, *Journal of Petroleum Technology*, 1985 - 89
- Associate Editor, *Society of Petroleum Engineers Journal*, 1985 - 89

Awards

- Henry J. Ramey Award of the Geothermal Resources Council for outstanding achievements in geothermal reservoir engineering, 2007
- Fellow, Geological Society of America, 2007
- Distinguished Visiting Scientist, ExxonMobil Upstream Research Co., 2007
- O.E. Meinzer Award of the Geological Society of America (GSA), 2006
- Fellow, American Geophysical Union, 2004
- Distinguished Lecturer, Texas A&M University, 2003
- Visiting Lecturer, United Nations University, Reykjavik/Iceland, 2002
- FLC Award of Merit for Excellence in Technology Transfer, 1996
- “Best of What’s New” Award, Popular Science Magazine, 1996 (with George Moridis)

LBL Technology Transfer Excellence Award, 1991
Geothermal Energy of New Zealand Travel Fellowship, 1988
Pergamon Geothermal Energy Award, 1988 (with Franco D'Amore)
NATO Research Fellowship, 1975, 1976
Annual Prize of the Friends and Patrons of the Goethe-University Frankfurt, for the best doctoral dissertation in the natural sciences, 1972

Patents

U.S. Patent No. 5,836,390 on “Method for Formation of Subsurface Barriers using Viscous Colloids” (with John Apps, Peter Persoff and George Moridis), November 17, 1998.
German Patent No. 19,707,096 on “Verfahren zur thermisch-unterstützten in situ Reinigung von Böden in der ungesättigten Zone ohne Verfrachtung flüssigen Schadstoffes in tiefer gelegene Bodenbereiche” (“Method for Thermally Enhanced *in situ* Decontamination of Unsaturated Zone Sediments without Transfer of Liquid Contaminants into Deeper Strata,” with Arne Färber, Christoph Betz, Reinhard Schmidt und Helmut Kobus), May 20, 1998.
U.S. Patent No. 5,311,766 on “Method and Apparatus for Determining Two-Phase Flow in Rock Fracture” (with Peter Persoff and Larry Myer), May 17, 1994.

Thesis Supervision

J.E. García, “*Fluid Dynamics of Carbon Dioxide Disposal into Saline Aquifers*,” PhD Thesis, University of California, Berkeley, 2003.
T.S. Liou, “*Statistical Analysis of Liquid Seepage in Partially Saturated, Heterogeneous Fracture Systems*,” PhD Thesis, University of California, Berkeley, 1999
G. Su, “*Liquid Seepage, Flow Dynamics, and Solute Transport in Unsaturated Rock Fractures*,” PhD Thesis, University of California, Berkeley, 1999
G. Su, “*Water Infiltration and Intermittent Flow in Rough-Walled Fractures*,” MS Thesis, University of California, Berkeley, 1995
A.E. Adenekan, “*Numerical Modeling of Multiphase Transport of Multicomponent Organic Contaminants and Heat in the Subsurface*,” PhD Thesis, University of California, Berkeley, 1992
C. Doughty, “*Two-Phase Fluid and Heat Flow in Fractured/Porous Media: A Similarity Solution*,” MS Thesis, University of California, Berkeley, 1991
R.W. Falta, “*Multiphase Transport of Organic Chemical Contaminants in the Subsurface*,” PhD Thesis, University of California, Berkeley, 1990
Y.S. Wu, “*Theoretical Studies of Non-Newtonian and Newtonian Fluid Flow Through Porous Media*,” PhD Thesis, University of California, Berkeley, 1990
A.K. Verma, “*Effects of Phase Transformation on Steam-Water Relative Permeabilities*,” PhD Thesis, University of California, Berkeley, 1986

Refereed Journal Publications (over 140 papers)

Kneafsey, T.J. and K. Pruess. Laboratory Flow Experiments for Visualizing Carbon Dioxide-Induced, Density-Driven Brine Convection, *Transport in Porous Media*, DOI 10.1007/s11242-009-9482-2, October 2009.

Spycher, N. and K. Pruess. A Phase-Partitioning Model for CO₂-Brine Mixtures at Elevated Temperatures and Pressures: Application to CO₂-Enhanced Geothermal Systems, *Transport in Porous Media*, DOI 10.1007/s11242-009-9425-y, July 2009.

Xu, T., P. Rose, S. Fayer and K. Pruess. On Modeling of Chemical Stimulation of an Enhanced Geothermal System Using a high pH Solution with Chelating Agent, *Geofluids*, Vol. 9, No. 2, pp 167–177, 2009.

Pruess, K. Formation Dry-Out from CO₂ Injection into Saline Aquifers: 2. Analytical Model for Salt Precipitation, *Water Resour. Res.*, Vol. 45, W03403, doi:10.1029/2008WR007102, 2009.

Pruess, K. and N. Müller. Formation Dry-Out from CO₂ Injection into Saline Aquifers: 1. Effects of Solids Precipitation and their Mitigation, *Water Resour. Res.*, Vol. 45, W03402, doi:10.1029/2008WR007101, 2009.

Birkle, P., K. Pruess, T. Xu, R.A. Hernández-Figueroa, M. Diaz-López and E. Conteras-López. Using Laboratory Flow Experiments and Reactive Chemical Transport Modeling for Designing Waterflooding of the Agua Fría Reservoir, Poza Rica-Altamira Field, Mexico, paper SPE 103869-PA, *SPE Reservoir Evaluation and Engineering*, pp. 1029–1045, December 2008.

Bolshov, L., P. Kondratenko and K. Pruess. Preface: Nonclassical Transport, *Vadose Zone J.*, Vol. 7, No. 4, pp. 1133–1134, doi: 10.2136/vzj2008.0109, November 2008.

Bolshov, L., P. Kondratenko, K. Pruess and V. Semenov. Non-classical Transport Processes in Geologic Media: Review of Field and Laboratory Observations and Basic Physical Concepts, *Vadose Zone J.*, Vol. 7, No. 4, pp. 1135–1144, doi: 10.2136/vzj2007.0153, November 2008.

Bolshov, L., P. Kondratenko, L. Matveev and K. Pruess. Elements of Fractal Generalization of Dual-Porosity Model for Solute Transport in Unsaturated Fractured Rocks, *Vadose Zone J.*, Vol. 7, No. 4, pp. 1152–1160, doi : 10.2136/vzj2007.0151, November 2008.

Goloviznin, V.M., I.A. Korotkin, K. Pruess, V.N. Semenov and O.S. Sorokovikova. Stochastic Models of Solute Transport in Highly Heterogeneous Geologic Media, *Vadose Zone J.*, Vol. 7, No. 4, pp. 1161–1171, doi : 10.2136/vzj2007.0150, November 2008.

Pruess, K. Leakage of CO₂ from Geologic Storage: Role of Secondary Accumulation at Shallow Depth, *Int. J. Greenhouse Gas Control*, Vol. 2, Issue 1, pp. 37–46, doi:10.1016/S1750-5836(07)00095-3, 2008.

Pruess, K. On CO₂ Fluid Flow and Heat Transfer Behavior in the Subsurface, Following Leakage from a Geologic Storage Reservoir, *Env. Geol.*, Vol. 54, No. 8, pp. 1677–1686, DOI 10.1007/s00254-007-0945-x, June 2008.

Pruess, K. On Production Behavior of Enhanced Geothermal Systems with CO₂ as Working Fluid, *Energy Conversion and Management*, Vol. 49, pp. 1446–1454, doi:10.1016/j.enconman.2007.12.029, 2008.

Finsterle, S., C. Doughty, M.B. Kowalsky, G.J. Moridis, L. Pan, T. Xu, Y. Zhang, and K. Pruess. Advanced Vadose Zone Simulations Using TOUGH, *Vadose Zone J.*, 7:601–609, doi:10.2136/vzj2007.0059, 2008.

Moridis, G.J., M.B. Kowalsky and K. Pruess. Depressurization-Induced Gas Production From Class 1 Hydrate Deposits, *SPE Reservoir Evaluation and Engineering*, pp. 458–481, October 2007.

Audigane, P., I. Gaus, I. Czernichowski-Lauriol, K. Pruess and T. Xu. Two-Dimensional Reactive Transport Modeling of CO₂ Injection in a Saline Aquifer at the Sleipner Site, North Sea, *American Journal of Science*, Vol. 307, pp. 974–1008, DOI 10.2475/07.2007.02, September 2007.

Gherardi, F., T. Xu and K. Pruess. Numerical Modeling of Self-limiting and Self-enhancing Caprock Alteration Induced by CO₂ Storage in a Depleted Gas Reservoir, *Chem. Geol.*, Vol. 244, pp. 103–129, 2007.

Xu, T., J.A. Apps, K. Pruess and H. Yamamoto. Numerical Modeling of Injection and Mineral Trapping of CO₂ with H₂S and SO₂ in a Sandstone Formation, *Chemical Geology*, Vol. 242, pp. 319–346, doi:10.1016/j.chemgeo.2007.03.022, 2007. (LBNL-57426)

Pruess K. and N. Spycher. ECO2N – A Fluid Property Module for the TOUGH2 Code for Studies of CO₂ Storage in Saline Aquifers, *Energy Conversion and Management*, doi:10.1016/j.enconman.2007.01.016, 2007.

Pruess, K. Enhanced Geothermal Systems (EGS) Using CO₂ as Working Fluid – A Novel Approach for Generating Renewable Energy with Simultaneous Sequestration of Carbon, *Geothermics*, Vol. 35, No. 4, pp. 351–367, August 2006.

Arthur, R., W. Zhou, T. Xu, K. Pruess and B. Stromberg, Experimental Calibration of a Reactive-Transport Model of Buffer Cementation, *Chinese J. of Rock Mechanics and Engineering*, Vol. 25, No. 4, 2006.

Xu, T., E. Sonnenthal, N. Spycher and K. Pruess. TOUGHREACT—A Simulation Program for Non-isothermal Multiphase Reactive Geochemical Transport in Variably Saturated Geologic Media: Applications to Geothermal Injectivity and CO₂ Geological

Sequestration, *Computers & Geosciences*, Vol. 32, pp. 145–165,
doi:10.1016/j.cageo.2005.06.014, 2006. (LBNL-56740)

Shan, C. and K. Pruess. An Analytical Solution for Slug Tracer Tests in Fractured Reservoirs, *Water Resour. Res.*, Vol. 41, W08502, doi:10.1029/2005WR004081, 2005.

Pruess, K. Numerical Studies of Fluid Leakage from a Geologic Disposal Reservoir for CO₂ Show Self-Limiting Feedback between Fluid Flow and Heat Transfer, *Geophys. Res. Lett.*, Vol. 32, No. 14, L14404, doi:10.1029/2005GL023250, July 2005. (LBNL-57362)

Battistelli, A. and K. Pruess. Modellistica della migrazione di contaminanti organici nel sottosuolo con il simulatore numerico compostionale TMVOC, *Osservatorio Siti Contaminati*, Vol. 1, pp. 94–120, 2005.

Spycher, N. and K. Pruess. CO₂-H₂O Mixtures in the Geologic Sequestration of CO₂. II. Partitioning in Chloride Brines at 12–100 °C and up to 600 bar, *Geochim. Cosmochim. Acta*, Vol. 69, No. 13, pp. 3309–3320, doi:10.1016/j.gca.2005.01.015, 2005. (LBNL-56334)

Xu, T., J.A. Apps and K. Pruess. Mineral Sequestration of Carbon Dioxide in a Sandstone-Shale System, *Chemical Geology*, Vol. 217, pp. 295–318, 2005. (LBNL-52566)

Wu, Y.S., L. Pan and K. Pruess. A Physically Based Approach for Modeling Multiphase Fracture-Matrix Interaction in Fractured Porous Media, *Advances in Water Resources*, Vol. 27, pp. 875 - 887, 2004. (LBNL-54749)

Doughty, C. and K. Pruess. Modeling Supercritical Carbon Dioxide Injection in Heterogeneous Porous Media, *Vadose Zone J.*, Vol. 3, pp. 837 - 847, 2004. (LBNL-52527)

Pruess, K. The TOUGH Codes—A Family of Simulation Tools for Multiphase Flow and Transport Processes in Permeable Media, *Vadose Zone J.*, Vol. 3, pp. 738 - 746, 2004. (LBNL-53630)

Todesco, M., J. Rutqvist, G. Chiodini, K. Pruess and C. Oldenburg. Modeling of Recent Volcanic Episodes at Phleorean Fields (Italy): Geochemical Variations and Ground Deformation, *Geothermics*, Vol. 33, No. 4, pp. 531 - 547, August 2004. (LBNL-53603)

Shan, C. and K. Pruess. EOSN - A New TOUGH2 Module for Simulating Transport of Noble Gases in the Subsurface, *Geothermics*, Vol. 33, No. 4, pp. 521 - 529, August 2004. (LBNL-52431)

Xu, T., Y. Ontoy, P. Molling, N. Spycher, M. Parini and K. Pruess. Reactive Transport Modeling of Injection Well Scaling and Acidizing at Tiwi Field, Philippines, *Geothermics*, Vol. 33, No. 4, pp. 477 - 491, August 2004. (LBNL-53991)

Pruess, K. Special Issue: Selected papers from the TOUGH Symposium 2003, Berkeley, 12-14 May, 2003 - Preface, *Geothermics*, Vol. 33, No. 4, pp. 399 - 400, August 2004.

Findikakis AN, Helmig R, Kitanidis P, Nimmo J, Pruess K, Rubin Y, Stauffer F, Tsang CF. Summary of a Panel Discussion at the International Groundwater Symposium held on March 25-28, 2002 in Berkeley, California, USA, *Journal of Hydraulic Research*, Vol. 42 (Special Issue SI):III-IV, 2004.

Pruess, K. Numerical Simulation of CO₂ Leakage from a Geologic Disposal Reservoir, Including Transitions from Super- to Sub-Critical Conditions, and Boiling of Liquid CO₂, *Soc. Pet. Eng. J.*, pp. 237 - 248, June 2004. (LBNL-52423)

Xu, T, J.A. Apps, and K. Pruess. Numerical Simulation of CO₂ Disposal by Mineral Trapping in Deep Aquifers, *Applied Geochemistry*, Vol. 19, Issue 6, pp. 917-936, June 2004. (LBNL-48399)

Pruess, K., J. García, T. Kovscek, C. Oldenburg, J. Rutqvist, C. Steefel and T. Xu. Code Intercomparison Builds Confidence in Numerical Simulation Models for Geologic Disposal of CO₂, *Energy*, Vol. 29, Issues 9-10, pp. 1431-1444, doi:10.1016/j.energy.2004.03.077, July-August 2004. (also: Lawrence Berkeley National Laboratory Report LBNL-52211)

Pruess, K. A Composite Medium Approximation for Unsaturated Flow in Layered Sediments, *J. Contam. Hydr.*, Vol. 70, No. 3-4, pp. 225-247, doi:10.1016/j.jconhyd.2003.09.007, June 2004. (LBNL-49609)

Oldenburg, C.M., S.W. Webb, K. Pruess and G.J. Moridis. Mixing of Stably Stratified Gases in Subsurface Reservoirs: A Comparison of Diffusion Models, *Transport in Porous Media*, Vol. 54, No. 3, pp. 323 - 334, 2004.

Lichtner, P.C., S. Yabusaki, K. Pruess and C.I. Steefel. Role of Competitive Cation Exchange on Chromatographic Displacement of Cesium in the Vadose Zone Beneath the Hanford S/SX Tank Farm, *Vadose Zone J.*, Vol. 3, pp. 203 - 219, 2004. (LBNL-55515)

Kiryukhin, A., T. Xu, K. Pruess, J. Apps and I. Slovtsov. Thermal-Hydrodynamic-Chemical (THC) Modeling Based on Geothermal Field Data, *Geothermics*, Vol. 33, No. 3, pp. 349 - 381, doi:10.1016/j.geothermics.2003.09.005, 2004. (LBNL-55514)

Su, G.W., J.T. Geller, J.R. Hunt and K. Pruess. Small-Scale Features of Gravity-Driven Flow in Unsaturated Fractures, *Vadose Zone J.*, Vol. 3, pp. 592 - 601, 2004. (LBNL-50691)

Pruess, K. and T. Xu. Numerical Simulation of Reactive Flow in Hot Aquifers (book review), *Geothermics*, Vol. 33, pp. 213 - 215, doi:10.1016/j.geothermics.2003.08.006, 2004. (LBNL-55513)

Todaka, N., C. Akasaka, T. Xu and K. Pruess. Reactive Geothermal Transport Simulation to Study the Formation Mechanism of Impermeable Barrier between Acidic and Neutral Fluid Zones in the Onikobe Geothermal Field, Japan, *J. Geophys. Res. Solid Earth*, Vol. 109(B5):5209, doi: 10.1029/2003JB002792, May 2004. (LBNL-52493)

Oldenburg, C.M., S.W. Webb, K. Pruess and G.J. Moridis. Mixing of Stably Stratified Gases in Subsurface Reservoirs: A Comparison of Diffusion Models, *Transport in Porous Media*, Vol. 54, No. 3, pp. 323 - 334, 2004. (LBNL-51545)

Spycher, N., K. Pruess and J. Ennis-King. CO₂-H₂O Mixtures in the Geological Sequestration of CO₂. I. Assessment and Calculation of Mutual Solubilities from 12 to 100 °C and up to 600 bar, *Geochim. Cosmochim. Acta*, Vol. 67, No. 16, pp. 3015 - 3031, doi:10.1016/S0016-7037(03)00273-4, 2003. (LBNL-50991)

Webb, S.W. and K. Pruess. The Use of Fick's Law for Modeling Trace Gas Diffusion in Porous Media, *Transport in Porous Media*, Vol. 51, No. 3, pp. 327-341, 2003.

Xu, T., J.A. Apps and K. Pruess. Reactive Geochemical Transport Simulation to Study Mineral Trapping for CO₂ Disposal in Deep Arenaceous Formations, *J. Geoph. Res.*, Vol. 108, No. B2, doi: 10.1029/2002JB001979, 2003.

Pruess, K., T. Xu, J. Apps and J. García. Numerical Modeling of Aquifer Disposal of CO₂, *SPE Journal*, pp. 49 - 60, 2003.

Pruess, K., S. Yabusaki, C. Steefel and P. Lichtner. Fluid Flow, Heat Transfer, and Solute Transport at Nuclear Waste Storage Tanks in the Hanford Vadose Zone, *Vadose Zone J.*, Vol. 1, No. 1-2, pp. 68 - 88, August 2002.

Pruess, K. Numerical Simulation of Multiphase Tracer Transport in Fractured Geothermal Reservoirs, *Geothermics*, Vol. 31, pp. 475 - 499, 2002.

Pruess, K. and J. García. Multiphase Flow Dynamics During CO₂ Injection into Saline Aquifers, *Environmental Geology*, Vol. 42, pp. 282 - 295, 2002.

Wu, Y.S., K. Zhang, C. Ding, K. Pruess, E. Elmroth and G.S. Bodvarsson. An Efficient Parallel-Computing Method for Modeling Nonisothermal Multiphase Flow and Multicomponent Transport in Porous and Fractured Media, *Adv. Wat. Resour.*, Vol. 25, pp. 243 - 261, 2002.

Battistelli, A. and K. Pruess. Il codice TMVOC per la simulazione numerica del trasporto di composti organici nel sottosuolo in condizioni multifase, *Bulletina della Società Italiana della Scienza del Suolo*, Vol. 50, No. 3, pp. 723 - 731, 2001.

Su, G.W., J.T. Geller, K. Pruess and J.R. Hunt. Solute Transport Along Preferential Flow Paths in Unsaturated Fractures, *Water Resour. Res.*, Vol. 37, No. 10, pp. 2481 - 2491, 2001.

O'Sullivan, M.J., K. Pruess and M.J. Lippmann. State of the Art of Geothermal Reservoir Simulation, *Geothermics*, Vol. 30, No. 4, pp. 395 - 429, 2001.

Xu, T. and K. Pruess. Modeling Multiphase Non-isothermal Fluid Flow and Reactive Geochemical Transport in Variably Saturated Fractured Rocks: 1. Methodology, *American Journal of Science*, Vol. 301, pp. 16-33, 2001.

Xu, T., E. Sonnenthal, N. Spycher, K. Pruess, G. Brimhall, and J. Apps. Modeling Multiphase Non-isothermal Fluid Flow and Reactive Geochemical Transport in Variably Saturated Fractured Rocks: 2. Applications to Supergene Copper Enrichment and Hydrothermal Flows, *American Journal of Science*, Vol. 301, pp. 34-59, 2001.

Oldenburg, C.M., K. Pruess, and S. M. Benson. Process Modeling of CO₂ Injection into Natural Gas Reservoirs for Carbon Sequestration and Enhanced Gas Recovery, *Energy & Fuels*, Vol. 15, pp. 293-298, 2001.

Xu, T. and K. Pruess. On Fluid Flow and Mineral Alteration in Fractured Caprock of Magmatic Hydrothermal Systems, *J. Geophys. Res.*, Vol. 106, No. B2, pp. 2121 - 2138, 2001.

Wu, Y.S. and K. Pruess. Numerical Simulation of Non-Isothermal Multiphase Tracer Transport in Heterogeneous Fractured Porous Media, *Adv. Wat. Resour.*, Vol. 23, pp. 699 - 723, 2000.

Wu, Y.S. and K. Pruess. Integral Solutions for Transient Fluid Flow Through a Porous Medium with Pressure-Dependent Permeability, *J. Rock Mechanics and Mining Sci.*, Vol. 37. No. 1-2, pp. 51 - 61, 2000.

Geller, J.Y., H.Y. Holman, G. Su, M.E. Conrad, K. Pruess, and J.C. Hunter-Cevera. Flow Dynamics and Potential for Biodegradation of Organic Contaminants in Fractured Rock Vadose Zones, *J. Contam. Hydr.*, Vol. 43, No. 1, pp. 63 - 90, 2000.

Xu, T., S.P. White, K. Pruess and G.H. Brimhall. Modeling of Pyrite Oxidation in Saturated and Unsaturated Subsurface Flow Systems, *Transport in Porous Media*, Vol. 39, No. 1, pp. 25 - 56, 2000.

Oldenburg, C.M. and K. Pruess. Simulation of Propagating Fronts in Geothermal Reservoirs with the Implicit Leonard Total Variation Diminishing Scheme, *Geothermics*, Vol. 29, pp. 1 - 25, 2000.

Oldenburg, C.M. and K. Pruess. Plume Separation by Transient Thermohaline Convection in Porous Media, *Geoph. Res. Lett.*, Vol. 26, No. 19, pp. 2997 - 3000, October 1, 1999.

Pruess, K., B. Faybishenko, and G.S. Bodvarsson. Alternative Concepts and Approaches for Modeling Unsaturated Flow and Transport in Fractured Rocks, *J. Contam. Hydr.*, Vol. 38, No. 1-3, pp. 281 - 322, 1999.

Xu, T., K. Pruess and G. Brimhall. An Improved Equilibrium-Kinetics Speciation Algorithm for Redox Reactions in Variably Saturated Subsurface Flow Systems, *Computers & Geosciences*, Vol. 25, pp. 655 - 666, 1999.

Pruess, K. A Mechanistic Model for Water Seepage through Thick Unsaturated Zones in Fractured Rocks of Low Matrix Permeability, *Water Resour. Res.*, Vol. 35, No. 4, pp. 1039 - 1051, 1999.

Su, G., J.T. Geller, K. Pruess, and F. Wen. Experimental Studies of Water Seepage and Intermittent Flow in Unsaturated, Rough-Walled Fractures, *Water Resour. Res.*, Vol. 35, No. 4, pp. 1019 - 1037, 1999.

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- Persoff, P., G.J. Moridis, J. Apps and K. Pruess. Evaluation Tests for Colloidal Silica for Use in Grouting Applications, *Geotechnical Testing Journal*, Vol. 21, No. 3, pp. 264 - 269, September 1998.
- Oldenburg, C.M. and K. Pruess. Layered Thermohaline Convection in Hypersaline Geothermal Systems, *Transport in Porous Media*, Vol. 33, pp. 29 - 63, 1998.
- Moridis, G. and K. Pruess. T2SOLV: An Enhanced Package of Solvers for the TOUGH2 Family of Reservoir Simulation Codes, *Geothermics*, Vol. 27, No. 4, pp. 415 - 444, 1998.
- Kneafsey, T.J. and K. Pruess. Laboratory Experiments on Heat-Driven Two-Phase Flows in Natural and Artificial Rock Fractures, *Water Resour. Res.*, Vol. 34, No. 12, pp. 3349 - 3367, 1998.
- Wu, Y.S. and K. Pruess. A Numerical Method for Simulating Non-Newtonian Fluid Flow and Displacement in Porous Media, *Adv. Wat. Resour.*, Vol. 21, pp. 351 - 362, 1998.
- Pruess, K. On Water Seepage and Fast Preferential Flow in Heterogeneous, Unsaturated Rock Fractures. *J. Contam. Hydr.*, Vol. 30, No. 3-4, pp. 333 - 362, 1998.
- Pruess, K. On Vaporizing Water Flow in Hot Sub-Vertical Rock Fractures, *Transport in Porous Media*, Vol. 28, pp. 335 - 372, 1997.
- Battistelli, A., C. Calore and K. Pruess. The Simulator TOUGH2/EWASG for Modeling Geothermal Reservoirs with Brines and Non-Condensable Gas, *Geothermics*, Vol. 26, No. 4, pp. 437 - 464, 1997.
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- Wu, Y.S. and K. Pruess. Flow of Non-Newtonian Fluids in Porous Media, *Adv. Porous Media*, Vol. 3, pp. 87 - 184, Elsevier, Amsterdam, The Netherlands, 1996.
- Oldenburg, C.M. and K. Pruess. Mixing with First-Order Decay in Variable Velocity Porous Media Flow, *Transport in Porous Media*, Vol. 22, pp. 161-180, 1996.
- Persoff, P. and K. Pruess. Two-Phase Flow Visualization and Relative Permeability Measurement in Natural Rough-Walled Rock Fractures, *Water Resour. Res.*, Vol. 31, No. 5, pp. 1175-1186, May 1995.
- Finsterle, S. and K. Pruess. Solving the Estimation-Identification Problem in Two-Phase Flow Modeling. *Water Resour. Res.*, Vol. 31, No. 4, pp. 913-924, April 1995.
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- "Coupled processes in geologic storage of CO₂," *Gordon Research Conference on "Flow and Transport in Permeable Media,"* August 2006.
- "Numerical Modeling of CO₂ Sequestration in Geologic Formations - Recent Results and Open Challenges," opening keynote address, *XVI Conference on Computational Methods in Water Resources*, Copenhagen/Denmark, June 2006.
- "Geologic Storage of Greenhouse Gases: Multiphase and Non-isothermal Effects, and Implications for Leakage Behavior," *Workshop on Coupled Modelling in Porous Media*, University of Utrecht, The Netherlands, September 2005.
- "Advances and Challenges in Numerical Modeling of Reactive Chemical Transport in Sulfur-Bearing Rock-Fluid Systems," *AGU Spring Meeting*, Montreal, Canada, May 2004.
- "A Composite Medium Approximation for Moisture Tension-Dependent Anisotropy in Unsaturated Layered Sediments," *AGU Fall Meeting*, San Francisco, CA, December 2001.
- "Modeling of Nonisothermal Multiphase Flows," *International Workshop on Subsurface Flow and Transport Phenomena*, Delft University of Technology, Delft, The Netherlands, October 23 - 27, 2000.
- "Multiphase Flow in Fractured Rocks - Lessons Learned from Mathematical Models," *International Symposium on Dynamics of Fluids in Fractured Rocks*, Berkeley, CA, February 10 - 12, 1999.

- “A Mechanistic Model for Fast Preferential Flow in Unsaturated Fractured Rock,” *AGU Fall Meeting*, San Francisco, CA, December 1997.
- “Incorporating Chemistry and Kinetics into Field-Scale Numerical Models,” DOE-BES Workshop on “*Scaling in Geological Processes*,” Bodega Bay, CA, September 1997.
- “Effective Parameters, Effective Processes: From Porous Flow Physics to In Situ Remediation Technology,” *VEGAS Symposium*, University of Stuttgart, Germany, 1995.
- “On the Validity of a Fickian Diffusion Model for the Spreading of Liquid Infiltration Plumes in Partially Saturated Heterogeneous Media,” *Tenth International Conference on Computational Methods in Water Resources*, Heidelberg, Germany, 1994.
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- “Hydrology of Partially Saturated Fractured Media,” *Workshop on Validation of Mathematical Models for Waste Repository Performance Assessment*, Nuclear Regulatory Commission, Washington, DC, 1986.
- “Phase Transformation Effects Near High-Level Nuclear Wastes Emplaced in Partially Saturated Fractured Formations,” *Workshop on Unsaturated Rock/Contaminant Transport*, Tucson, AZ, 1986.
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